

**Volodymyr SHEVCHENKO**

**Using a cochlear implant in The  
Rehabilitation of People with Profound  
Hearing Impairment**

**Introduction.**

According to world statistics, hearing loss is the most common disorders in newborns. 1-2 child in a thousand are born with serious hearing impairment or deafness is 2-4 children have an average degree of violation. Deafness means not only the inability to hear sounds. Pathology of the auditory system may significantly affect the anatomical, physiological and psychological development, and hence the formation of the child.

Deaf Child preferably not be taught oral language. At the same time normal language skills - a necessary factor to achieve the desired level of intellectual, emotional and social development. It is also the basis for the integration of the child in the hearing community and opens the way for a program of integration and inclusion. As a result, the child receives a quality education in the future will have a high chance of successful employment in accordance with the desired qualifications of the job. This is the basis for high self-esteem and self-sufficient and thus help to achieve a better quality of life [2, p. 3].

Today, to help people with profound hearing loss by using cochlear implantation. The use of cochlear implants has become a recognized treatment for a high degree of hearing loss and deafness (Bogomil M.R., Dyakonov I.M., Dayhes M.A., Queen I.V., Mironov E.V., Tavarkiladze G.A., Ovchinnikov Y.M. Lantsev A.A., Janow J.K. et al.). In Ukraine, the number of people with cochlear implants, mostly deaf children is increasing every year and this time reached more than a thousand people [3, p. 8].

**Cochlear implants** - the most promising direction that provides sufficient hearing for speech perception and communication process of formation by implantation of the implant in the ear curl. Surgery is usually performed under general anesthesia and takes about 2 hours. Most people after surgery returned to normal activities within ten days [1, p. 54].

**Cochlear implant (CI)** - an electronic device that performs the function of damaged or missing hair cells and provides electrical stimulation surviving nerve fibers. Unlike hearing aids, CI does not make sounds louder, it provides useful sound information by direct stimulation of surviving fibers of the auditory nerve, helps a person to perceive sounds.

**Cochlear implant provides:**

- Restoration of auditory perception thresholds of 30-40 dB sensitivity regarding thresholds, that provides opportunities almost normal speech perception. To realize these opportunities need an adequate setting speech processor specialists and compulsory rehabilitation, employment of qualified experts at a special individual training program and adapting to the peculiarities of «auditory» perception;

- Significant improvement in the perception of familiar, everyday ambient sounds (sound of the doorbell, doorbell, or the sound of the motor horn, call, music, etc.) [1 p. 49-50].

**Stages cochlear implant.** Cochlear implantation - multicomponent system of measures, which include:

1. Integrated diagnostic examination;
2. Selection of patients;
3. Surgery;
4. Preoperative and postoperative rehabilitation [3, p. 24-28].

**The main indications for cochlear implant:**

1. Deep sensorineural deafness in both ears (increase sound perception threshold in the speech range of 0.5, 1 and 2 kHz - more than 95 dB);

2. Thresholds auditory perception in the free sound field using optimally matched hearing aids (binaural hearing aid), exceed 55 dB at frequencies of 2-4 kHz speech intelligibility at least 50%;

3. Lack improve auditory perception of speech after using hearing aids optimally matched with a high degree of bilateral sensorineural deafness (middle ear perception threshold up to 90 dB), using vehicles for 3-6 months (children who suffered from meningitis, this period may be reduced);

4. Lack of psychological problems;

5. The absence of concomitant somatic diseases;

6. No contraindications for surgery;

7. Parental consent for surgical intervention, information about the need for a long period of postoperative rehabilitation and their commitment to it [1, p. 53].

#### **Age criteria:**

The effectiveness of cochlear prosthesis depends on many factors, one of which is the age of the child, early detection and timely hearing aid. Proved that early started with hearing and speech development and early child's age at the time of the transaction with CI lead to the best results. It is therefore most appropriate for cochlear prosthesis is the age of two years. In this case, the optimal rehabilitation results can be achieved in under 3 years. If residual hearing, surgery is performed on the ear with the least damage. Today we know that the maximum age limit for the child's cochlear prosthesis is 5 years. It was at this time, subject to corrective work hard, still remains the possibility of hearing and speech [3, p. 8]. Later, the brain loses plasticity, that is not so easily absorb sound broadcasting.

The question of implantation older children should be decided individually in each case, taking into account medical, psychological and social performance.

#### **Contraindications for cochlear implant are:**

1. Inflammation of the middle ear;
2. Eardrum perforation;
3. Full or partial curl overgrowth preserve normal function of hair cells;
4. Full or partial but significant obstruction curl;
5. Negative results electrophysiological testing;
6. Related severe physical illness;
7. Intellectual Disabilities;
8. The presence of focal pathology in cortical and subcortical brain structures;
9. The lack of preparedness for prolonged postoperative rehabilitation work in adults; lack of support for family members and their willingness to prolonged rehabilitation of the child; lack of support from local experts [1, p. 53-54].

**Unreasonableness of cochlear implantation:**

1. The presence of residual hearing, sufficient for effective prosthetic modern digital hearing aids.
2. Lack of experience with earphone or use powerful enough or properly configured earphone.
3. Low perspectives of CI for the development of auditory perception and oral language. Preferably, it is typical for children aged 6 years and adolescents with congenital deafness.

**In some cases held bilateral cochlear implantation.** It provides:

1. Formation of opportunities to localize sound;
2. Improving legibility in silence;
3. Improved speech intelligibility during noise;
4. Bilateral stimulation of the auditory pathways and the auditory centers;
5. Best dynamics of auditory and language development of children;
6. In the event that one implant out of order, the person remains the ability to perceive sounds and language.

At the same time we must understand that cochlear implantation - this last step, by which the child can hear and develop a hearing. After her return to the use of a hearing aid can not be. So you need a fairly balanced approach to this step [4, p. 7].

Cochlear implant allows it to hear all the carriers, but the efficiency understanding of language as a means of communication in all different. It depends on several factors:

1. Time of hearing loss (before or after language acquisition);
2. The period between hearing loss and cochlear implants;
3. The individual features (motivation, ability to learn);
4. Pre- and postoperative rehabilitation;
5. Close cooperation between parents, teachers and children;
6. Availability language environment;
7. The presence in the regions under trained [3, p. 24-28].

**Components of postoperative rehabilitation:**

1. Fine tuning cochlear implant;
2. The development of communication skills;
3. The development of auditory perception of surrounding sounds and speech via CI;
4. The development of language skills;
5. The development of non-verbal intelligence and other mental functions and motor skills;
6. Psychological help the child and his family [1, p. 59].

The purpose of CI is the socialization of children. Please note that children in special schools is always accompanied by the fact that they hardly communicate with each other spoken languages, and using gestures, facial expressions and «simplified» dactylology. Even successfully carried out rehabilitation work with them very significant improvement auditory perception do not change the way they communicate. So even Liebig S.S. (1984)

considered the optimal training of children in secondary schools and their family education [5, p. 40-41].

The high performance hearing and speech rehabilitation occurs in most children who have lost hearing after the capture of speech. A month after connecting the sound processor they restored the ability to understand speech in auditory-visual-based communication in different situations. These children, in the future, can learn in schools, work in groups and those institutions they choose, that is fully integrated into society.

In children with congenital deafness or hearing loss early (to master speech), auditory and speech rehabilitation takes much longer. The process as a whole, as well as developing the ability of speech understanding and ability to speak, takes 3-5 years and more. The level of understanding of speech and their own speech in some children with CI can vary considerably - from almost normal to the limited household words and phrases.

The process of hearing and speech rehabilitation for children with CI requires cooperation of a number of experts - teachers, audiologist, speech therapy, neuropsychiatrist and acoustics. At the same patients after surgery retain the relationship with the Center for auditory rehabilitation almost throughout life. This is due to the need to address the many issues caused by peculiarities of operation of cochlear implantation (CCI): Adjust the audio processor replacement over time, at the request of the person, the external system elements cochlear implant new modifications, the need to purchase batteries, control efficiency CCI periodic consultations professional and control of auditory and speech rehabilitation [5, p. 40-41].

Quite important mission in a successful hearing and speech rehabilitation for children with CI belongs to the parents and relatives. The participation of parents in this process and their psychological and social support to a child is one of the essential components of the entire system before and after surgery.

They regularly take part in various rehabilitation activities in accordance with the recommendations of experts.

Parents need to learn the skills of self-study for the development of auditory perception and speech [3, p. 8-9]. An important aspect of individual work with children is that this work should not become a permanent compulsory classes, and must take place in conditions of everyday life and during the game. For a full hearing and speech rehabilitation of the child is important that the family prevailed monolingualism.

Overall, the joint work of experts and parents should be limited to ensure that at the end of preschool children in their development reached the level of hearing peers. This will give them the ability to learn in school. The prerequisites for such integration is its ample hearing and mental abilities.

G. Hausman back in 1981, said that the joint training of children with hearing and hearing is the first for the following benefits:

- The ability to provide individual development;
- Permanent residence in the language environment;
- Frequency of sessions and games with them;
- Communicating with children of all ages;
- Maximum use of compensatory brain capacity [5, p. 48-49].

The key to successful education of children in schools - permanent and systematic cooperation of family and school. It is necessary to achieve unity of pedagogical influence in school and family.

So cochlear implantation in Ukraine is developing rapidly. Each year, an increasing number of carriers and in each case there are issues associated with further rehabilitation. That is why the collaboration of parents and school educational activities among parents remain very relevant topics. Such cooperation is crucial to the successful rehabilitation of children with cochlear implants.

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### Abstracts

**VOLODYMYR SZEWCZENKO. Zastosowanie implantu ślimakowego w rehabilitacji osób z głęboką wadą słuchu.**

W artykule przedstawiono warunki i zasady efektywnego wykorzystania ślimakowego metodą implantacji do rehabilitacji dzieci z głębokim upośledzeniem słuchu. Opisane czynniki i elementy rehabilitacji, rola rodziców w procesie rehabilitacji. Dziś, aby pomóc ludziom z głębokim ubytkiem słuchu za pomocą



implantacji ślimaka. Jego celem jest socjalizacja dzieci. Skuteczność ślimakowego protezy zależy od wielu czynników, z których jeden jest wiek dziecka, wczesnego wykrywania i terminowego aparatu słuchowego. Wykazano, że wczesne rozpoczął rozwój słuchu i mowy i wczesnego wieku dziecka po wszczepieniu prowadzić do uzyskania najlepszych wyników. Jest zatem najbardziej odpowiednia dla protezy ślimaka jest wiek dwóch lat. W tym przypadku, optymalne wyniki dla rehabilitacji można osiągnąć w ciągu 3 lat. Implant ślimakowy pozwala usłyszeć wszystkich przewoźników, ale zrozumienie efektywności języka jako środka komunikacji w ogóle inna. Dość ważnym zadaniem w udanym słuchu i mowy rehabilitacji dzieci należy do rodziców i krewnych. Udział rodziców w tym procesie i ich psychologiczne i społeczne wsparcie dla dziecka jest jednym z podstawowych elementów całego systemu przed i po operacji. Regularnie bierze udział w różnych zajęciach rehabilitacyjnych zgodnie z zaleceniami ekspertów. Ich wspólna praca jest zachowany, aby pod koniec wieku przedszkolnym dzieci w ich rozwoju osiągnął poziom słuchu rówieśników. To daje im możliwość uczenia się w szkole. Warunkiem takiej integracji jest jego duży słuchu i zdolności umysłowe.

**Słowa kluczowe:** implanty ślimakowe, rehabilitacja, dzieci z tytułu utraty wartości, rola rodziców, socjalizacji i integracji słuchu.

#### **ВОЛОДИМИР ШЕВЧЕНКО. Використання кохлеарної імплантації в реабілітації осіб з глибокими порушеннями слуху.**

В статті розкрито умови та правила ефективного використання методу кохлеарної імплантації для реабілітації дітей з глибокими порушеннями слуху. Окреслено фактори та компоненти реабілітації, визначено роль батьків в процесі реабілітації. На сьогодні допомогти людині з глибокою втратою слуху можна за допомогою кохлеарної імплантації. Метою її проведення є соціалізація дітей. Ефективність кохлеарного протезування залежить від багатьох факторів, одними з яких є вік дитини, раннє виявлення та своєчасне слухопротезування. Доведено, що рано розпочата робота з розвитку слуху та мовлення і ранній вік дитини під час імплантування призводять до найкращих результатів. Саме тому найбільш оптимальним для кохлеарного протезування є вік до двох років. В цьому випадку оптимальні результати реабілітації можуть бути досягнуті у віці до 3 років. Кохлеарний імплант дає змогу чути всім його носіям, але ефективність розуміння мови як засобу спілкування у всіх різна. Досить важлива місія в успішній слуховій та мовленнєвій реабілітації дітей належить батькам та рідним. Участь батьків у цьому процесі та їх психологічна і соціальна підтримка дитини є одним з істотних компонентів всієї системи роботи до та після операції. Саме вони постійно

приймають участь у різних реабілітаційних заходах відповідно до рекомендацій фахівців. Їх спільна робота має зводитись до того, щоб на кінець дошкільного віку діти за своїм розвитком вийшли на рівень чуючих однолітків. Це забезпечить їм здатність до навчання у загальноосвітній школі. Передумовами такої інтеграції є її достатній слух та розумові здібності.

**Ключові слова:** кохлеарна імплантація, реабілітація, діти з порушеннями слуху, роль батьків, інтеграція та соціалізація.

**ВЛАДИМИР ШЕВЧЕНКО. Использование кохлеарной имплантации в реабилитации лиц с глубокими нарушениями слуха.**

В статье раскрыты условия и правила эффективного использования метода кохлеарной имплантации для реабилитации детей с глубокими нарушениями слуха. Определены факторы и компоненты реабилитации, определена роль родителей в процессе реабилитации. На сегодня помочь человеку с глубокой потерей слуха можно с помощью кохлеарной имплантации. Целью ее проведения является социализация детей. Эффективность кохлеарного протезирования зависит от многих факторов, одним из которых является возраст ребенка, раннее выявление и своевременное слухопротезирование. Доказано, что рано начатая работа по развитию слуха и речи и ранний возраст ребенка во время имплантирования приводят к наилучшим результатам. Именно поэтому наиболее оптимальным для кохлеарного протезирования является возраст до двух лет. В этом случае оптимальные результаты реабилитации могут быть достигнуты в возрасте до 3 лет. Кохлеарный имплант позволяет слышать всем его носителям, но эффективность понимания языка как средства общения у всех разная. Достаточно важная миссия в успешной слухоречевой реабилитации детей принадлежит родителям и родным. Участие родителей в этом процессе и их психологическая и социальная поддержка ребенка является одним из существенных компонентов всей системы работы до и после операции. Именно они постоянно принимают участие в различных реабилитационных мероприятиях в соответствии с рекомендациями специалистов. Их совместная работа должна сводиться к тому, чтобы к концу дошкольного возраста дети по своему развитию вышли на уровень слышащих сверстников. Это обеспечит им способность к обучению в общеобразовательной школе. Предпосылками такой интеграции является ее достаточный слух и умственные способности.

**Ключевые слова:** кохлеарная имплантация, реабилитация, дети с нарушениями слуха, роль родителей, интеграция и социализация.

**VOLODYMYR SHEVCHENKO. Using a cochlear implant in the rehabilitation of people with profound hearing impairment.**

The article reveals thoroughly the conditions and rules for effective use of cochlear implantation method for rehabilitation of children with profound hearing impairment. Outlined the factors and components of rehabilitation, the role of parents in the process of rehabilitation. Today, to help people with profound hearing loss by using cochlear implantation. Its aim is the socialization of children. The effectiveness of cochlear prosthesis depends on many factors, one of which is the age of the child, early detection and timely hearing aid. Proved that early started with hearing and speech development and early age of the child when implanted lead to the best results. It is therefore most appropriate for cochlear prosthesis is the age of two years. In this case, the optimal rehabilitation results can be achieved in under 3 years. Cochlear implant allows it to hear all the carriers, but the efficiency understanding of language as a means of communication in all different. Quite important mission in the successful auditory and speech rehabilitation of children belongs to the parents and relatives. The participation of parents in this process and their psychological and social support to a child is one of the essential components of the entire system before and after surgery. They regularly take part in various rehabilitation activities in accordance with the recommendations of experts. Their joint work has kept to ensure that at the end of preschool children in their development reached the level of hearing peers. This will give them the ability to learn in school. The prerequisites for such integration is its ample hearing and mental abilities.

**Keywords:** cochlear implantation, rehabilitation, children with hearing impairment, the role of parents, integration and socialization.